

NATURAL RESOURCES CONSERVATION SERVICE
DOCUMENTATION REQUIREMENTS FOR
IRRIGATION SYSTEM, MICROIRRIGATION
TREE, SHRUB, AND VEGETABLE IRRIGATION

CODE 441

Design Criteria

Design in accordance with the criteria listed in [Conservation Practice Standard 441, Irrigation System, Microirrigation](#), and the procedure outlined for microirrigation in [National Engineering Handbook Part 652 \(NEH 652\), Irrigation Guide, Section KS652.0605\(d\)](#), and in [NEH 652, Section KS652.0980\(d\)\(3\)](#).

Surveys

Record survey data on [Form NRCS-ENG-28 and Form NRCS-ENG-29, Loose Leaf Field Sheet](#), or [Forms KS-ENG-37 and KS-ENG-37a, Field Notes](#), (or equivalent). Run a ground surface profile survey along the proposed centerline of the main line, the manifold or sub-main, and the entire length of the lateral lines. If it can be determined, run the profile on the lateral line which will represent the maximum operating condition for the system. Usually this will be the longest lateral and also the furthest from the water source. If not, run the profile midway between the rows of vegetation that the lateral lines will serve. Take and record ground elevation shots at 100-foot intervals and at all significant high or low points (± 2.0 foot) that occur between the regular stations.

On relatively uniform systems with less than 10.0 feet of overall elevation difference, take selective elevation shots in lieu of a standard profile survey at the following:

- Water source.
- Beginning and end of the manifold or sub-main.
- At all significant breaks in elevation (as defined above) along the lateral line(s) including the end point(s). Standard engineering notes as shown in [Chapter 1 in National Engineering Handbook Part 650](#).

[Engineering Field Handbook](#), should be prepared to document this type of survey.

Set at least 1 permanent benchmark--preferably at or near the well or water source. Set reference or working hubs as needed.

Design and Plan

If the microirrigation system will serve a windbreak or wildlife planting, complete [Form KS-ECS-5, Tree/Shrub Planting](#) (if applicable).

Develop the microirrigation system design in accordance with the "Design Criteria" section above.

Use the [Irrigation System, Microirrigation-441 \(Tree, Shrub, and Vegetable Irrigation\) Spreadsheet](#) as follows:

- Select whether microtubing or drip tape will be used for the design.
- If drip tape is to be used, enter the design information for the drip tape (for example, inlet pressure, emitter spacing, tape diameter). The other information needed for the drip tape will be calculated.
- For both the microtubing and the drip tape, enter information about the system (for example, source elevation, source pressure, pipe size for each reach, stations, number of outlets, flow, natural ground elevation). The spreadsheet will calculate head loss, hydraulic grade line, pipeline pressure, and velocity.
- The hydraulic grade line will be plotted on the "Profile" sheet. This will visually show the working pressure conditions at all points along the system.
- On the "KS-ENG-207" sheet (Form KS-ENG-207, Irrigation System, Microirrigation-441 (Tree, Shrub, and

Vegetable Irrigation)), record the design information and quantities in the tables provided. The plan view of the system can be drawn by hand, or the Excel drawing capability can be used.

- On the Form KS-ENG-207 remarks area, list the recommended operating conditions for the system.
- Also on Form KS-ENG-207, complete the title block by listing the name of the landowner and legal description. Sign the "Designed by," "Checked by," and "Approved by" blocks and enter the respective dates.

Layout

Ordinarily, sufficient stations, alignment, and grade stakes will be set when the design survey is made. If additional reference stakes are needed, they should be documented on the original survey notes. Sign the "Layout by" block and enter the date on Form KS-ENG-207.

Checkout

Sufficient checking of the completed system should be done to make certain it was installed as shown on the plans. This would include the correct location and size of all lines and fixtures--especially the spacing and type of emitters installed. Sign the "Checkout by" block and enter the date on Form KS-ENG-207.